

EXHIBIT E: Mouse Fuct-VII gene, from phage 104, annotated with DNA sequencing primers used to sequence the phage, with start and stop codons, and with relevant restriction sites. Mouse genomic DNA sequence displayed from position 25,277,900 to 25,282,400 containing the coding sequence for the mouse Fuct-VII gene

CTACCCTGCT	CTGGTTGGAC	GAGGGTCCAC	AAGGTCTCTT	AGGCTGGGTA	GAATAGAATG	60
GATGGGACGA	GACCAACCTG	CTCCCAGGTG	TTCCAGAGAA	TCCGACCCAT	CTTATCTTAC	
TGTGATCCTG	ATCCTGGAAC	CCCAGATGTA	AAGCTGGGTT	TGGGTGCCCT	TGTGAGTGAG	120
ACACTAGGAC	TAGGACCTTG	GGGTCTACAT	TTGCACCCAA	ACCCACGGGA	ACACTCACTC	
GAGGCCTGGT	GAGGTGAGGT	GGTATGTTGA	GGTCCCCTGG	CTTTCCTTTT	GACTCATGAT	180
CTCCGGACCA	CTCCACTCCA	CCATACAAC	CCAGGGGACC	GAAAGGGAAA	CTGAGTACTA	
GTCTCACATT	CCCCCACCC	CCTTTTCCAT	CCTGACCCCA	TTTCTGAGCT	AAATTTCCGA	240
CAGAGTGTA	GGGGGGTGGG	GGAAAAGGTA	GGACTGGGGT	AAAGACTCGA	TTTAAAGGCT	
ACTGACTCCT	CAGTTGGCAA	GTTCTCATGG	TCAGGTGCCC	TACAGTTAAC	AGACCCTGTG	300
TGACTGAGGA	GTCAACCGTT	CAAGAGTACC	AGTCCACGGG	ATGTCAATTG	TCTGGGACAC	
GGACCCTCCT	CCAAACTGAG	CTGGCATGGG	GAGGGGGTCA	GTATAACAGC	AAGGCAGATG	360
CCTGGGAGGA	GGTTTGACTC	GACCGTACCC	CTCCCCCAGT	CATATTGTCTG	TTCCGTCTAC	
TGGGGGAGGT	TCCTTCAAAT	CCACCCAGGA	AGGGAAGAGC	ATGTGGGCGT	GGGTGAGGCT	420
ACCCCTCCA	AGGAAGTTTA	GGTGGGTCTT	TCCCTTCTCG	TACACCCGCA	CCCACTCCGA	
GGGGCAAAGG	CCCCAGCCAG	CCTGGCGGCA	CAAACAGGAA	GGACAGCAGG	CTCTGGCAGC	480
CCCCGTTTCC	GGGGTTCGGT	GGACCGCCGT	GTTTGTCTTT	CCTGTCTGTC	GAGACCGTCG	
CAGAAGCCTG	TGGCCCCAAG	CTGGCAGGAT	GGCCCCCTTC	CTGCAGGTCC	CCCACAGCCT	540
GTCTTCGGAC	ACCGGGGTTC	GACCGTCTTA	CCGGGGGAAG	GACGTCCAGG	GGGTGTCTGGA	
TCTGGGTTCC	TGACACGAGA	GAAGAGGTGG	GGCGGGGTGA	AGTGAACTCT	GAAGCCAAAA	600
AGACCCAAGG	ACTGTGCTCT	CTTCTCCACC	CCGCCCCACT	TCACTTGAGA	CTTCGGTTTTT	
TGTGACTCTC	CTGGGGTCAC	CAGCTTGGGG	AGAGGTGAAG	AAAGATGCCG	GGGCGGAAAC	660
ACACTGAGAG	GACCCAGTGG	GTCGAACCCC	TCTCCACTTC	TTT CTACGGC	CCCGCCTTTG	
AAAGGGGCAG	ATATCACTAT	GGTTATCTTA	CTAAGCACAG	AGTAACTGAA	AAAGCAAGGG	720
TTTCCCCGTC	TATAGTGATA	CCAATAGAAT	GATTTCGTGTC	TCATTGACTT	TTTCGTTCCC	
TACCGCTGCC	CACCTCGTGC	CCACCTTACG	TTATACCTCA	AACCAGCTAG	ATAGTTTCTG	780
ATGGCGACGG	GTGGAGCACG	GGTGAATGTC	AATATGGAGT	TTGGTTCGATC	TAT CAAAGAC	
ATGGCACCCA	TACCCTCCCT	TCCCCTTTAG	GCATTGCGCA	AGCTCTCCAC	CACAATCTGG	840
TACCGTGGGT	ATGGGAGGGA	AGGGGAAATC	CGTAACGCGT	TCGAGAGGTG	GTGTTAGACC	
AAGTTATACC	CTGCGAGGGG	ATGGG CAGGG	CACTTCTGAG	GTGCCAATCA	GCCTGCACTC	900
TTCAATATGG	GACGCTCCCC	TACCCGTCCC	GTGAAGACTC	CACGGTTACT	CGGACGTGAT	
GCCTCTGCCC	TGGCCATGGC	ACTGCTGTCA	GTTTCTTGGT	ACCTGTCTCA	ACAGCAGCCT	960
CGGAGACGGG	ACCGGTACCG	TGACGACAGT	CAAAGAACCA	TGGACAGAGT	TGTCGTCTGGA	
TGTCACGTGA	GACTATGGCT	GGCGGTGGGG	GTGGGGGCAG	GAATCCTAGA	AGCACAGGAG	1020
ACAGTGCACT	CTGATACCGA	CCGCCACCCC	CACCCCGTCT	CTTAGGATCT	TCGTGTCCTC	
TGACATAGGG	TCGGGTTCGG	CAGAG CGAAG	TGTAGGAAGT	GATCCCCAAA	GGGATGCTGG	1080
ACTGTATCCC	AGCCCAGCCC	GTCTCGCTTC	ACATCCTTCA	CTAGGGGTTT	CCCTACGACC	
GGACGATCTG	GCCAACACTG	TCCTCCCAT	CAAAACTCCC	AGTCTG GAGC	TCTGGGACAT	1140
CCTGCTAGAC	CGGTTGTGAC	AGGAGGGTAA	GTTTTGAGGG	TCAGAC CTCG	AGACCCTGTA	

EXHIBIT E

GGACAAGCCA	GGCCTGCTAT	TCTCCATACA	GGGCTCCATA	GTGTCTGGCT	CAGCAGAGTG	1200
CCTGTTCCGGT	CCGGACGATA	AGAGGTATGT	CCCAGAGTAT	CACAGACCGA	GTCGTCTCAC	
	8993				887B	
GGGGATCTGG	TGGGGATGGA	GGAAGCTTAG	CTAAAAGCTT	TGTATAGGCT	GAAGCTCTGA	1260
CCCCTAGACC	ACCCCTACCT	CCTTCGAATC	GATTTTCGAA	ACATATCCGA	CTTCGAGACT	
GTGACCCTGC	TGGGCCACCC	TACCCTGGTC	TGGGCTGGGT	CATTGCATCC	CCAGATTGGA	1320
CACTGGGACG	ACCCGGTGGG	ATGGGACCAG	ACCCGACCCA	GTAACGTAGG	GGTCTAACCT	
AGGCTTGGTG	AGATGGAGAG	GAACCTTGGC	TACAAGCTAT	AGCTTTGCCC	ACCAGAGCCT	1380
TCCGAACCAC	TCTACCTCTC	CTTGGAACCG	ATGTTTCGATA	TCGAAACGGG	TGGTCTCGGA	
	3511B			671B		
GCTGGAGGGG	AATCAAACAA	GCCTGGACCT	GAGGCTGGGA	CTAGCTTTCC	TGTTTCTGGA	1440
CGACCTCCCC	TTAGTTTGT	CGGACCTGGA	CTCCGACCCT	GATCGAAAGG	ACAAAGACCT	
Start codon						946B
GTGG ATG CCA	ACCCCCTGCC	CACCAGCCTG	CCTGTCCACG	CCAGGGACAC	ACAGACTCCT	1500
CACCT TAC GGT	TGGGGGACGG	GTGGTCGGAC	GGACAGGTGC	GGT CCTGTG	TGTCTGAGGA	
TCCCTTTCCA	GACTGGAAAG	CCCCCTCCTG	GGAGAGCAGG	AAGGAAGCAA	CCTGCAACTC	1560
AGGGAAAGGT	CTGACCTTTC	GGGGGAGGAC	CCTCTCGTCC	TTCCTTCGTT	GGACGTTGAG	
715B	2931B					
TTCCAGCCCT	GG ACCTTGGG	CTGAACCTAC	AGTTCAAGGT	TTGTATGCTC	ACAGGTCTTG	1620
AAGGTCGGGA	CCTGGAACCC	GACTTGGATG	TCAAGTTCCA	AACATACGAG	TGTCCAGAAC	
			2932B		PstI	
GCAGGGAAAG	ATAAGAATCC	CCAGGGCACC	CTCCCCCCCCG	CCCCCCAGTC	CACTGCAGGT	1680
CGTCCCTTTC	TATTCTTAGG	GGTCCCCTGG	GAGGGGGGGC	GGGGGGTCAG	GT GACGTCCA	
AGCTCCTGGG	TCTGCCCTTC	AGGGCAAGTG	CTGACGCTCC	ATCAGACTGT	GATGGGGCCC	1740
TCGAGGACCC	AGACGGGAAG	TCCCCTTCAC	GACTGCGAGG	TAGTCTGACA	CTACCCCGGG	
			8661A			
TTTTCTGAGG	ATGACAATTC	TGAGAACAAG	GCAT TTTTCT	AGAGGTGGCA	GAACAGCATT	1800
AAAAGACTCC	TACTGTTAAG	ACTCTTGTTT	CGTAAAAAGA	TCTCCACCGT	CTTGTCTGTA	
TTGTGATGCC	CGAGGATCTG	GGAGCACAGG	TCCAGCTTAA	TGAGGGATTG	GAGGAAGTGG	1860
AACACTACGG	GCT CCTAGAC	CCTCGTGTCC	AGGTCGAATT	ACTCCCTAAC	CTCCTTCACC	
			911B			
GTATCATCAT	TACAGGGAGG	GGCCTCTGTG	GCCTCCTGGG	AAAATGCAGT	TGCTCTCTTT	1920
CATAGTAGTA	ATGTCCCTCC	CCGGAGACAC	CGGAGGACCC	TTTTACGTCA	ACGAGAGAAA	
					9077	
GGGTGGCCTG	GGGTTGTGTG	GTGGGCAGAG	GACGGAGGTG	CTCATTGGGG	GAAGGGATCA	1980
CCCACCGGAC	CCCAACACAC	CACCCGTCTC	CTGCCTCCAC	GAGTAACCCC	CTTCCCTAGT	
CTTCTGCTCA	GAGTGCTCGC	AAGGGCCTTT	CCTTTTCCTG	AAGGCAAGCA	GGCCTCCTCC	2040
GAAGACGAGT	CTCACGAGCG	TTCCCGGAAA	GGAAAAGGAC	TTCCGTTTCT	CCGAGAGGAGG	
			9076		3445B	
TCCTCCTCTT	CCTCCTTCTC	CTCTTCCTCC	TCTTTCTCCA	TATGC CTAGC	TGGTCATTTC	2100
AGGAGGAGAA	GGAGGAAGAG	GAGAAGGAGG	AGAAAGAGGT	ATACGGATCG	ACCAGTAAAG	

EXHIBIT E

						8953	
TAGGG ACCAG	CATGGTTGGG	AAGGGGGCCT	TGTCTTGGCC	TTCCTCTTGT	CTCAATTCCC	2160	
ATCCCTGGTC	GTACCAACCC	TTCCCCCGGA	ACAGAACCGG	AAGGAGAACA	GAGTTAAGGG		
TCTTTGAGCA	GAAGACGGGG	TGGGTGGGGT	AGGGTTGGAT	AGTGGTTGAT	GCCAAAGATT	2220	
AGAAACTCGT	CTTCTGCCCC	ACCCACCCCA	TCCCAACCTA	TCACCAACTA	CGGTTTCTAA		
						3512B	8952
GAAGGGGTAG	GGCGGGGCAG	AAGTGGGAAG	GTCCCT TGGCT	TCCTCACCTT	GGTAGATGGT	2280	
CTTCCCCATC	CCGCCCCGTC	TTCACCCTTC	CAGGGACCGA	AGGAGTGGAA	CCATCTACCA		
GAGGAGCCCC	AGAGGTTGAG	CTGAGCAGCA	GCTGTGATTT	CAGGGTGCCT	CTGTTGGAGA	2340	
CTCCTCGGGG	TCTCCAACCTC	GACTCGTCGT	CGACACTAAA	GTCCACGGA	GACAACCTCT		
						8904	
GGCTGCTGTG	ATTTGAAAAT	CTTCTTTCCT	TGGT GACAAT	TCCAGAAGGC	TCCAGATGAA	2400	
CCGACGACAC	TAAACTTTTA	GAAGAAAGGA	ACCACTGTTA	AGGTCTTCCG	AGGTCTACTT		
						AflII	
TTGTATTGGT	GAGTGCCTGG	CC TTAAGCA	GTCCCAGCTG	GGGATGATGG	GGATTTATGG	2460	
AACATAACCA	CTCACGGACC	GGGAATTTCGT	CAGGGTCGAC	CCCTACTACC	CCTAAATACC		
						8903	8902
GTGTCCCTGA	GCCTAGGGTG	ACAGGGCCTC	TCCTTTTTTT	TTTATTCTGC	TTTCTAGGTTAC	2520	
CACAGGGACT	CGGATCCAC	TGTCCCGGAG	AGGAAAAAAA	AAATAAGACG	AACTCC CATG		
CACCC CACCA	GGAGGCTGCG	GGCCTGGGGC	GGCCTAGCTG	GAGGAGCAAC	ATTCATGGTA	2580	
GTGGG TGGT	CCTCCGACGC	CCGGACCCCG	CCGGATCGAC	CTCCTCGTTG	TAAGTACCAT		
ATTTGGTTTT	TCTGGCTGTG	GGGATCAGCT	CCTGGAAGTG	CCCCTGTGCC	TCAGTCCACA	2640	
TAAACCAAAA	AGACCGACAC	CCCTAGTCGA	GGACCTTCAC	GGGGAC ACGG	AGTCAGGTGT		
						624B	8875
CTCACCATCC	TTATCTGGCA	CTGGCCTTTC	ACCAACCGGC	CGCCAGAGCT	ACCTGGTGAC	2700	
GAGTGGTAGG	AATAGACCGT	GACCGGAAAG	TGGTTGGCCG	GCGGTCTCGA	TGGACCACTG		
						8874	
ACCTGCACTC	GCTATGGCAT	GGCCAGCTGC	CGTCTGAGTG	CTAACCGGAG	CCTGCTAGCC	2760	
TGGACGTGAG	CGATACCGTA	CCGGTCGACG	GCAGACTCAC	GATTGGCCTC	GGACGATCGG		
						8867	
AGTGCTGATG	CTGTGGTCTT	CCACCACCGT	GAGCTGCAAA	CCCGGCAATC	TCTCCTACCC	2820	
TCACGACTAC	GACACCAGAA	GGTGGTGGCA	CTCGACGTTT	GGGCCGTTAG	AGAGGATGGG		
						8851	
CTGGACCAGA	GGCCACACGG	ACAG CCTTGG	GTCTGGGCCT	CCATGGAATC	GCCCAGTAAT	2880	
GACCTGGTCT	CCGGTGTGCC	TGTCGGAACC	CAGACCCGGA	GGTACCTTAG	CGGGTCATTA		
ACCCATGGTC	TCCATCGCTT	CCGGGGCATC	TTCAACTGGG	TGCTGAGCTA	TCGGCGTGAT	2940	
TGGGTACCAG	AGGTAGCGAA	GGCCCCGTAG	AAGTTGACCC	ACGACTCGAT	AGCCGCACTA		
						EcoRI	8850
TCAGATATCT	TTGTACCCTA	CGGTCGCTTG	GAGCCTCTCT	CTGGG CCCCAC	ATCCCCACTA	3000	
AGT CTATAGA	AACATGGGAT	GCCAGCGAAC	CTCGGAGAGA	GACCCGGGTG	TAGGGGTGAT		
CCGGC CAAAA	GCAGGATGGC	TGCCTGGGTG	ATCAGCAATT	TCCAGGAGCG	GCAGCAGCGT	3060	
GGCCGGTTTT	CGTCCTACCG	ACGGACCCAC	TAGTCGTTAA	AGGTCCTCGC	CGTCGTCGCA		
						PstI	8852
GCAAAGCTGT	ACCGGCAGCT	GGCCCCTCAT	CTGCAGGTGG	ATGTGTTTCG	TCGCGCCAGC	3120	
CGTTT CGACA	TGGCCGTCGA	CCGGGGAGTA	GACGTCCACC	TACACAAGCC	AGCGCGGTGC		
GGACGGCCCC	TATGCGCTAA	TTGTCTGCTG	CCCCTTTTGG	CCCGGTACCG	CTTCTACCTG	3180	
CCTGCCGGGG	ATACGCGATT	AACAGACGAC	GGGTGAAACC	GGGCCATGGC	GAAGATGGAC		
						8714	
GCCTTTGAGA	ACTCACAGCA	TCGGGACTAC	ATCACTGAGA	AGTTCTGGCG	CAATGCCCTG	3240	
CGGAAACTCT	TGAGTGTCGT	AGCCCTGATG	TAGTGACTCT	TCAAG ACCGC	GTTACGGGAC		
						8715	
GCGGCTGGTG	CTGTACCCGT	GGCGCTGGGA	CCTCCTCGGG	CCACCTACGA	GGCTTTTGTG	3300	
CGCCG ACCAC	GACATGGGCA	CCGCGACCCT	GGAGGAGCCC	GGTGGATGCT	CCGAAAACAC		
						8715	8848
CCACCAGATG	CCTTTGTACA	CGTGGACGAC	TTCAGCTCTG	CCCGTGA AACT	GGCTGTCTTC	3360	
GGTGGTCTAC	GGAAACATGT	GCACCTGCTG	AAGTCGAGAC	GGGCACTTGA	CCGACAGAAG		

EXHIBIT E

CTCGTCAGCA	TGAATGAGAG	TCGTTATCGT	GGCTTCTTTG	CTTGCGGAGA	CCGGCTCCGT	3420
GAGCAGTCGT	ACTTACTCTC	AGCAATAGCA	CCGAAGAAAC	GAACCGCTCT	GGCCGAGGCA	
	8868	8849				
GTGCGGCTCC	TGGGTG ACTG	GAGGGAGCGC	TTCTGCACCA	TCTGTGCCCCG	CTACCCTTAC	3480
CACGCCGAGG	ACCCACTGAC	CTCCCTCGCG	AAGACGTGGT	AGAC CAGGGC	GATGGGAATG	
				Stop codon	8876	
TTGCCCCGCA	GCCAGGTCTA	TGAAGACCTT	GAAAGCTGGT	TCCAGGCT TG	AACTCCTGCT	3540
AACGGGGCGT	CGGTCCAGAT	ACTTCTGGAA	CTTTCGACCA	AGGTCCGAAC	TTCAGGACGA	
				625B		
GCTGGGAGAG	GCTGGATGGG	TGGGAGACTG	ATGTTGAAAC	CAAAGAGCTG	GGCATCCAGG	3600
CGACCCTCTC	CGACCTACCC	ACCCTCTGAC	TACAACTTTG	GTTTCTCGAC	CCGTAGGTCC	
				8905	EcoRI	
CTTTTGGTCA	CCATGGCACT	ACCCCAAGGC	TTTTCTCTGTT	CAGTGAG CAG	GAATTCAGGA	3660
GAAAACCGT	GGTACCGTCA	TGGGGTTCCG	AAAAGGACAA	GTCACCTCTC	CTTAAGTCCT	
	8877					
TATAAGGAGA	AAACTGGGCT	GAGATGCCCT	GGTGGGCTTT	AGAGTAGGGG	CCCAGGATAA	3720
ATATTCTCT	TTTGACCCGA	CTCTACGGGA	CCACCCGAAA	TCTCATCCCC	GGGTCCTATT	
GAGACAATGA	ATTAATGAGG	AGCATATGGG	GAAGGTGGCT	GAGGGTCCCT	GACTTACCTT	3780
CTCTGTTACT	TAATTACTCC	TCGTATACCC	CTTCCACCGA	CTCCAGGGA	CTGAATGGAA	
GACCCATGGC	TGAAGGCTCC	ATGCCCATGG	CTGGAGCTGG	GACCCTACAC	TTCTATAGTC	3840
CTGGGTACCG	ACTTCCGAGG	TACGGGTACC	GACCTCGACC	CTGGGATGTG	AAGATATCAG	
	8954					
AAGGTGCTTA	GCCTCA AGGT	TGCAGATGCA	CCCTCTAGTA	CTCTGGGTGC	AGACTGTACA	3900
TTCCACGAAT	CGGAGTTCCA	ACGTCTACGT	GGGAGATCAT	GAGACCCACG	TCTGACATGT	
			8967			
CTGGGCGCAG	GGGGTTGTGG	AAGGACAGTG	CAGATGATT	TGGGCTTTTG	ACACCACAGT	3960
GACCCGCGTC	CCCCAACACC	TTCTGTGTC	GTCTACTAAG	ACCCGAAAAC	TGTGGTGTCA	
			End of cDNA (G, bold and underlined)			
TCCCCAGGG	AAAGAGGCAC	TACTAATAAA	AACTGACA	<u>GAAATCTCCT</u>	GGTCAAGTCT	4020
AGGGGGTCCC	TTTCTCCGTG	ATGATTATTT	TTGTGACTGT	CTTTAGAGGA	CCAGTTCAGA	
	SacI					
GTTAGGCAGC	AGAGCTCACC	AGCCAGCTTC	CTCTGCTCAA	TTCCCTCCGG	CAGCCATTAT	4080
CAATCCGTCG	TCTCGAGTGG	TCGGTCGAAG	GAGACGAGTT	AAGGGAGGCC	GTCGGTAATA	
TGGGTTTCTC	GTTTCTGTCT	GAGAGCCTTG	CTTGAGTGGT	ACCTTACCAG	GAACCAAAG	4140
ACCCAAAGAC	CAAAGACAGA	CTCTCGGAAC	GAACTCACCA	TGGAATGGTC	CTTGAGTTTC	
			8713			
CCCACGGCAG	GTACAGACCT	GAGAACTGAG	GTCAGACACA	GCTGTGGCTG	AGGTGCCACA	4200
GGGTGCCGTC	CATGTCTGGA	CTCTTGACTC	CAGTCTGTGT	CGACACCGAC	TCCACGGTGT	
TGTCATAGGT	CTCAGTGGGA	GGTGTGTCCT	GTGTGATGGG	GTGTGATGTA	TCCGTTAGGG	4260
ACAGTATCCA	GAGTACCCCT	CCACACAGGA	CACACTACCC	CACACTACAT	AGGCAATCCC	
	PstI					
CTTTCACTGA	AGAGCCT GCT	GCAGGTGCCC	ACTGTGTTGG	ACTGGGTGGG	CCAGGAGGAG	4320
GAAAGTGACT	TCTCGGAC GA	CGTCCACGGG	TGACACAACC	TGACCCACCC	GGTCCTCCTC	
ATGAGAGGTG	AGGCTATGAG	TGTATGACAG	ATTGAGCTCC	TGGGATGGGC	TGGGGCTTGG	4380
TACTCTCCAC	TCCGATACTC	ACATACTGTC	TAACTCGAGG	ACCCTACCCG	ACCCCGAACC	
GTTTGTCCGG	GGATGGGGTG	GCAGTACAGG	CAGGAAGCTG	CCCTCCCCCT	GTGGTTTGTG	4440
CAAACAGGCC	CCTACCCAC	CGTCATGTCC	GTCCTTCGAC	GGGAGGGGGA	CACCAAACAC	
GGAAAGGCCT	AACCATGGCT	TCCTGCCCTA	ATCTAGCCTC	ATGGG		4485
CCTTTCCGGA	TTGGTACCGA	AGGACGGGAT	TAGATCGGAG	TACCC		